

We claim:

1. A laminate film comprising:

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a polyolefin resin layer having a discharge-treated surface on one side of said polyolefin resin layer comprising at least 0.3% nitrogen functional groups on said discharge-treated surface; and

a metal layer having an optical density of at least about 2.6 deposited on said discharge-treated surface of said polyolefin resin layer.

2. The laminate film of claim 1, further comprising:

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a heat sealable layer or winding layer comprising an antiblock component selected from the group consisting of amorphous silicas, aluminosilicates, sodium calcium aluminum silicate, a crosslinked silicone polymer and polymethylmethacrylate.

3. A laminate film comprising:

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a first polyolefin resin layer having a first surface and a second surface;

a second polyolefin resin layer disposed on the first surface of said first polyolefin resin layer having a discharge-treated surface on said second polyolefin resin layer disposed on the side opposite that of the first polyolefin layer comprising at least about 0.3% nitrogen functional groups on said discharge-treated surface;

a metal layer having an optical density of at least about 2.6 deposited on said second polyolefin resin layer; and

a heat sealable layer or a winding layer disposed on the second surface of said first polyolefin resin layer.

4. The laminate film according to claim 1, wherein said polyolefin resin layer has a thickness of about 6 to 40 μm .

5. The laminate film of claim 1, wherein said polyolefin resin layer comprises a polypropylene resin.

6. The laminate film of claim 2 or 3, wherein said heat-sealable layer or winding layer has a thickness of about 0.5 to 5.0 μm .

7. The laminate film of claim 2 or 3, wherein said heat sealable or winding layer comprises an anti-blocking agent of about 0.05 to 0.5 percent by weight of said heat sealable or winding layer.

8. The laminate film of claim 2 or 3, wherein said heat sealable layer comprises a ternary ethylene-propylene-butene copolymer.

9. The laminate film of claim 2 or 3, wherein said winding layer comprises a crystalline polypropylene or a matte layer of a block copolymer blend of polypropylene and one or more other polymers having a roughened surface.

10. The laminate film of claim 2 or 3, wherein said winding layer is treated to provide a surface for lamination or coating with adhesives or inks.

11. The laminate film of claim 1, 2 or 3, wherein said metal layer has a thickness of about 5 to 100 nm.

12. The laminate film of claim 1, 2 or 3, wherein said metal layer has an optical density of about 2.6 to 5.0.

13. The laminate film of claim 1, 2 or 3, wherein said metal layer comprises aluminum.

14. The laminate film of claim 3, wherein said second polyolefin resin layer comprises additives that enhance metal adhesion or metal formation.

15. The laminate film of claim 3, wherein said second polyolefin resin layer has a thickness of about 0.2 to 5.0 μm .

16. The laminate film of claim 3, wherein said second polyolefin resin layer comprises a polypropylene resin

17. The laminate film of claim 14, wherein said second polyolefin resin layer comprises an additive selected from the group consisting of petroleum resins and terpene resins.

18. The laminate film of claim 17, wherein the additive comprises about 5 to 30 percent by weight of said second polyolefin resin layer.

19. The laminate film of claim 14, wherein said second polyolefin resin layer comprises an additive selected from the group consisting of linear crystalline polyethylene waxes, branched polyethylene waxes, hydroxyl-terminated polyethylene waxes, and carboxyl-terminated polyethylene waxes.

20. The laminate film of claim 19, wherein the additive comprises about 1 to 15 percent by weight of said second polyolefin resin layer.

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23. The laminate film of claim 1, 2, or 3, wherein said discharge-treated surface is formed in an atmosphere of CO_2 and N_2 .

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24. The laminate film of claim 1, 2 or 3, wherein said metal layer comprises:
a layer of aluminum oxide of about 30Å thick;
an aluminum-enriched layer comprising at least about 95% aluminum of about 200-500Å total thickness; and
an aluminum-enriched layer of at least about 98% aluminum of about 50-150Å thickness.

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25. A laminate film comprising:
a polyolefin resin layer having a discharge-treated surface; and
a metal layer having an optical density of at least about 2.6
deposited on said discharge-treated surface;
wherein the laminate film has a barrier durability under 9%
elongation of 46.5 cc/m²/day or less oxygen transmission rate through the laminate film.

26. The laminate film of claim 25, further comprising:
a heat sealable layer or winding layer comprising an antiblock
component selected from the group consisting of amorphous silicas, aluminosilicates,
sodium calcium aluminum silicate, a crosslinked silicone polymer and
polymethylmethacrylate.

27. A laminate film comprising:
a first polyolefin resin layer having a first surface and a second
surface;
a second polyolefin resin layer disposed on the first surface of said
first polyolefin resin layer;
a metal layer having an optical density of at least about 2.6
deposited on said second polyolefin resin layer; and
a heat sealable layer or a winding layer disposed on the second
surface of said first polyolefin resin layer
wherein the laminate film has a barrier durability under 9%
elongation of 46.5 cc/m²/day or less oxygen transmission rate through the laminate film.

28. The laminate film according to claim 25, wherein said polyolefin resin
layer has a thickness of about 6 to 40 μ m.

29. The laminate film of claim 25, wherein said polyolefin resin layer
comprises a polypropylene resin.

30. The laminate film of claim 26 or 27, wherein said heat-sealable layer or winding layer has a thickness of about 0.5 to 5.0 μm .

31. The laminate film of claim 26 or 27, wherein said heat sealable or winding layer comprises an anti-blocking agent of about 0.05 to 0.5 percent by weight of said heat sealable or winding layer.

32. The laminate film of claim 26 or 27, wherein said heat sealable layer comprises a ternary ethylene-propylene-butene copolymer.

33. The laminate film of claim 26 or 27, wherein said winding layer comprises a crystalline polypropylene or a matte layer of a block copolymer blend of polypropylene and one or more other polymers having a roughened surface.

34. The laminate film of claim 26 or 27, wherein said winding layer is treated to provide a surface for lamination or coating with adhesives or inks.

35. The laminate film of claim 25, 26 or 27, wherein said metal layer has a thickness of about 5 to 100 nm.

36. The laminate film of claim 25, 26 or 27, wherein said metal layer has an optical density of about 2.6 to 5.0.

37. The laminate film of claim 25, 26 or 27, wherein said metal layer comprises aluminum.

38. The laminate film of claim 27, wherein said second polyolefin resin layer comprises additives that enhance metal adhesion or metal formation.

39. The laminate film of claim 27, wherein said second polyolefin resin layer has a thickness of about 0.2 to 5.0 μm .

40. The laminate film of claim 27, wherein said second polyolefin resin layer comprises a polypropylene resin.

41. The laminate film of claim 38, wherein said second polyolefin resin layer comprises an additive selected from the group consisting of petroleum resins and terpene resins.

42. The laminate film of claim 41, wherein the additive comprises about 5 to 30 percent by weight of said second polyolefin resin layer.

43. The laminate film of claim 38, wherein said second polyolefin resin layer comprises an additive selected from the group consisting of linear crystalline polyethylene waxes, branched polyethylene waxes, hydroxyl-terminated polyethylene waxes, and carboxyl-terminated polyethylene waxes.

44. The laminate film of claim 43, wherein the additive comprises about 1 to 15 percent by weight of said second polyolefin resin layer.

45. The laminate film of claim ~~25, 26~~, or 27, wherein said discharge-treated surface is formed in an atmosphere of CO_2 and N_2 .

46. The laminate film of claim 25, 26 or 27, wherein said metal layer comprises:

a layer of aluminum oxide of about 30Å thick;

an aluminum-enriched layer comprising at least about 95% aluminum of about 200-500Å total thickness; and

an aluminum-enriched layer of at least about 98% aluminum of about 50-150Å thickness or more.